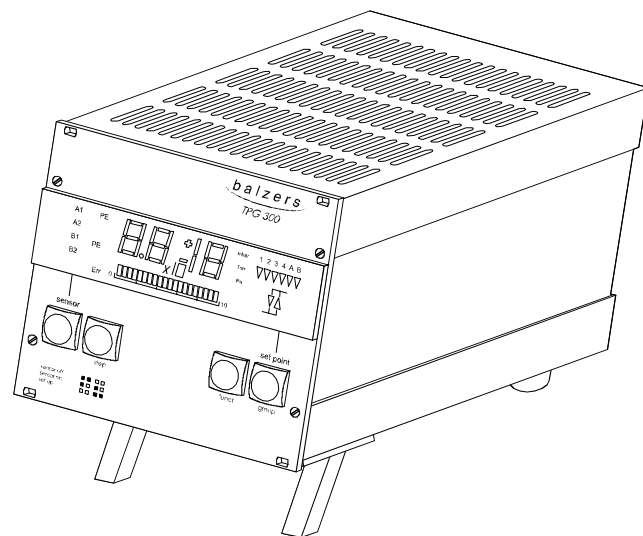


TPG 300



BG 800 300 BE / A (0105)

Product identification

When communicating with Balzers, the information given on the product nameplate is required. Transfer therefore that information to this manual.

Typ:	<i>balzers</i>

No:	-----
F-No:	-----

If your unit is supplied with the plug-in boards already installed, there is an additional nameplate on it. Transfer that information also to this manual.

Typ:	<i>balzers</i>

No:	-----
F-No:	-----

Validity

This manual applies to products with part number

BG 546 900 -T

The part number can be taken from the nameplate.

This manual is based on firmware version

BG 509 780 -F

Proceed according to paragraph 4.7.10 to check that your unit is equipped with this or a higher firmware version (-F or higher).

Enter the firmware version number of your unit here:

BG 509 780 –

The functions described as well as the illustrations and data contained in this manual are subject to change without notice.

Intended use

Depending on which options have been chosen for it, the TPG 300 can measure total pressure from atmosphere to 10^{-11} mbar. It can trigger a number of pressure-dependent functions to control and monitor vacuum devices and processes. The instructions contained in this document must be strictly followed.

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1 Safety

1.1 Safety information

- Take into account the relevant safety regulations when installing the product (→ 9).
- Take into account the relevant safety regulations when installing the product and putting it into operation.

Pass on the safety information to other users.

1.2 Explanation of symbols



DANGER:

Information on preventing any kind of personal injury or extensive equipment damage.



CAUTION:

Special information on damage prevention.



NOTE:

Special information on cost-effective use.



Specialists:

This work may only be carried out by persons with suitable technical training and the necessary experience.



Press this key briefly.



Press these keys simultaneously.

<....> Marking

«....» Display, response

»....« Operating mode, effect

→ See page

→ See document



Tip, recommendation



... please contact your nearest Balzers Service Center.

1.3 General stipulations

Since the individual electronic components are delicate, appropriate measures must be taken to protect them from static electricity. Store plug-in modules in antistatic bags or containers.

Damage resulting from disregard of the above warning may lead to a revocation of the warranty.

Balzers accepts no responsibility nor warranty if the user or third parties

- utilize the product not according to the defined use
- make any kind of changes (modifications, alterations, etc.) to the product
- use the product with accessories not listed in the product documentation.

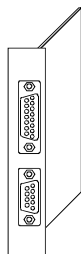
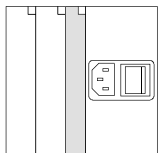
2 System overview



Information for correct installation of the plug-in boards
→ [3].

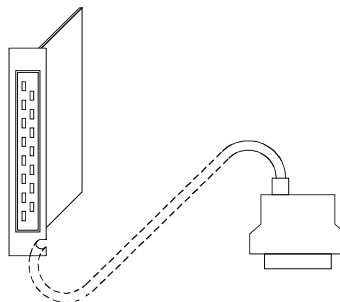
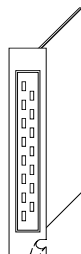
A list of all plug-in boards suited for the TPG 300 can be found in section 5.3. For detailed information on the plug-in boards → [3].

Interface plug-in boards



Relay and
RS-232-C (RS-422)
interface

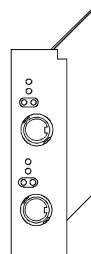
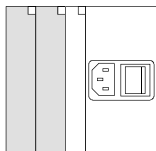
e.g.
IF 300A
IF 300C



Relay and
RS-232-C interface

e.g.
IF 300B

Measurement plug-in boards

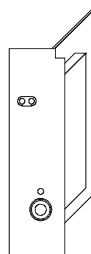
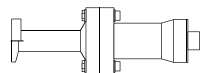


Dual Pirani
e.g.
PI 300D

TPR 010

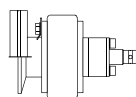


TPR 017 / TPR 018

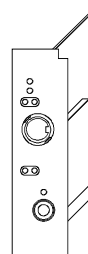
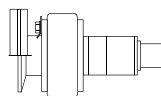


Cold cathode
e.g.
PE 300C9
PE 300T10
PE 300DC10

IKR 050 / IKR 060



IKR 070

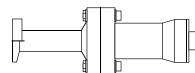


Pirani / cold cathode
combined
e.g.
CP 300C9

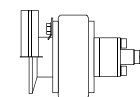
TPR 010



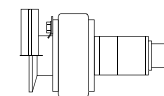
TPR 017 / TPR 018



IKR 050 / IKR 060



IKR 070



3 Installation



If for any reason you can assume that the unit is not safe to operate, shut it down and secure it so that it cannot be inadvertently turned on again.

You can assume that the unit is not safe to operate when

- it has sustained visible damage
- it no longer functions
- it has been stored for a longer period under unfavorable conditions
- it has been subjected to severe transport stress
- when the screws of the plug-in boards are loose or missing.

3.1 Mains power connection

You can connect the TPG 300 without voltage adaptation to any conventional supply system (→ section 5.1).



The power connector may only be plugged into a socket with a protective ground. Only three-pin mains cables with a correctly connected protective ground may be used. This protection must not be nullified by an extension cable without ground conductor.

To assure continuous grounding protection, connect the mains power cable before connecting any other cables. In the same way, disconnect all other cables before disconnecting the mains power cable.

If the unit is installed in a rack, the mains voltage should be supplied by and turned on via a central distributor.

3.2 Plug-in boards

3.2.1 Factory configuration

In most cases, the TPG 300 is supplied ready for operation, (with the plug-in boards already installed). In addition, in units for combined measurement of medium and high vacuum, the high vacuum measuring circuit is controlled automatically according to pressure. This is because switching function A and / or B is factory assigned to a medium vacuum measuring circuit (→ section 4.7.3).

There are two types of configuration:

- Units with CP 300 measurement plug-in board(s)
The cold cathode measuring circuit is controlled by the Pirani measuring circuit which is on the same measurement plug-in board.
- Units with PI 300D and PE 300 measurement plug-in boards
The cold cathode measuring circuit is controlled by the Pirani measuring circuit <TPR 2>.

The controlling Pirani gauge and the controlled cold cathode gauge must both be connected to the same vacuum chamber to guarantee efficient operation.

No measuring circuit assignment is activated by all other factory configurations.

3.2.2 Installing / removing plug-in boards



For safety reasons, empty slots should always be covered with blank plates.

Installing / removing plug-in boards → [3].

3.3 Connecting plug-in boards

→ [3]

3.4 Installation in a 19" rack



If the unit is to be installed in a rack, it must not lower the protection class of the rack (protection against foreign objects and water) e.g. DIN VDE 0113 regulations for switch cabinets when in place.

Take into account the ambience conditions (→ section 5.2).

The TPG 300 can be installed in a 19" rack mount adapter according to DIN 41 494 . However, it cannot be installed in the old rack frames constructed according to the Balzers standard.

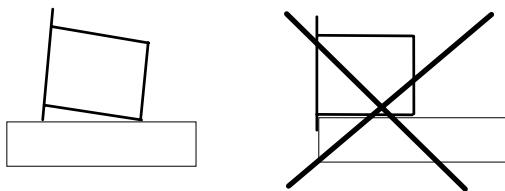
Older units (Balzers standard) are to be installed in the same rack frame as the TPG 300 (DIN), a special adapter must be used (→ section 9.6).

3.5 Use as bench top unit



Take into account the ambience conditions (→ section 5.2).

The ventilation must not be obstructed.



Use the cover and the hinged feet (→ 62).

4 Operation

4.1 Measuring with the TPG 300

4.1.1 Power on procedure



Before switching the unit on, check that all plug-in boards, connection cables, and gauges are installed correctly (→ 9) and that the technical requirements are satisfied (→ 34).



If a break in the protective ground occurs inside or outside the unit or if the protective ground connection is detached, the unit will become dangerous. Intentional interruption is not admissible.

The mains power switch is located on the back panel of the unit. To switch the unit on, operate the mains power switch (or the centrally switched mains power distributor in case of installation into a rack).

After the power has been switched on,

- the unit performs a self-test
- it reactivates the parameters in effect before the unit was switched off
- all measuring circuits with activated immediate start-up (→ section 4.7.9) and all operational Pirani gauges are switched on
- the measurement value of the first measuring circuit in operation is displayed.

4.1.2 Gas type dependence

The measured pressure depends on the gas type present. It is referenced to nitrogen (N₂). For other gases please refer to the characteristic curves shown in the appendix of [3].

4.1.3 Validity of displayed data

If you intend to use the measurement results for control functions, allow for the time constants of the gauges, possible ignition delays etc., until valid measurements are displayed (→ [3]; [7] ... [10]).

4.1.4 Accuracy of measurement

A generally applicable statement on the accuracy of the measurement cannot be made. The type of gas being measured is a major factor affecting the accuracy, and so is the current condition of the gauge.

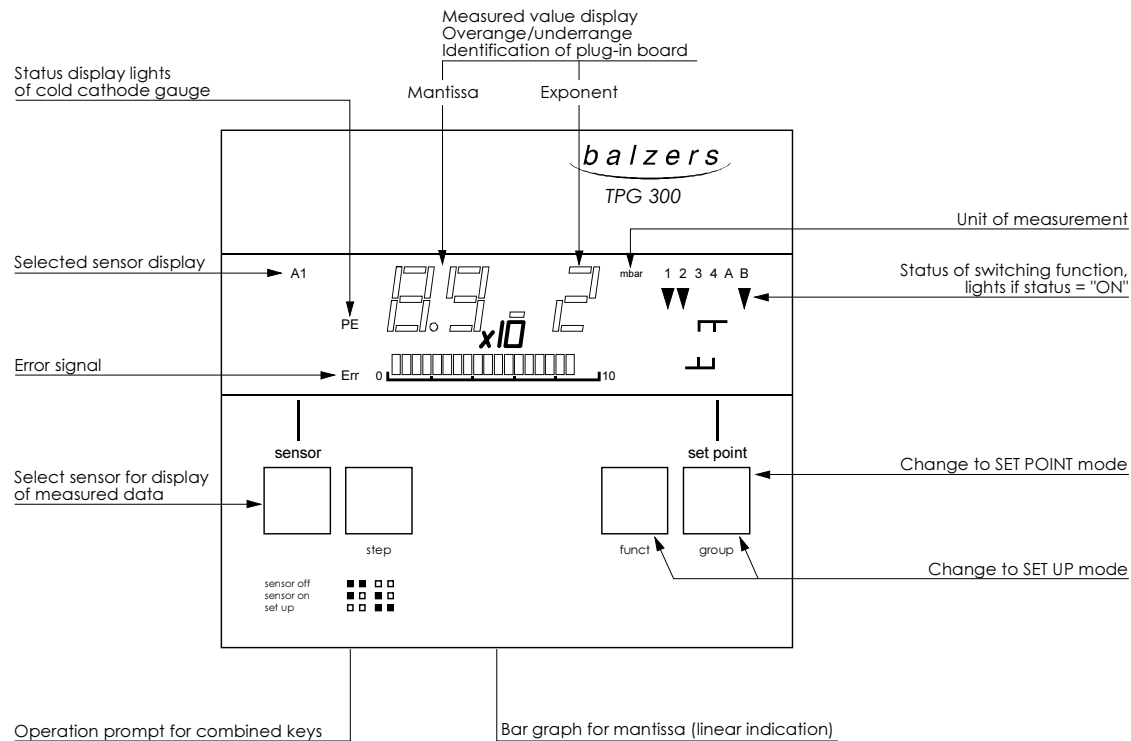
The accuracy of the gauge at any particular moment can only be assessed by comparing the results with a reference unit. Calibration pumping systems are available for reliable measurements, particularly for pressures under 10⁻⁴ mbar.

4.1.5 Alignment

Cold cathode measuring circuits are factory aligned and require no recalibration.

Pirani measuring circuits are factory prealigned. For accurate measurement → [3].

4.2 Front panel



4.3 Operating modes

The TPG 300 has three operating modes:

»sensor«

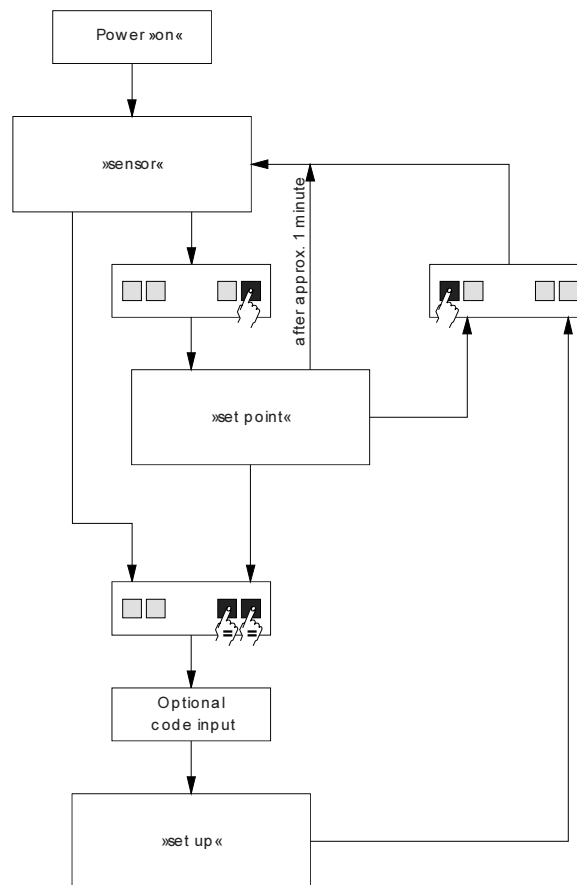
- Pressure measurement
- Selection of the measuring circuit
- Switching gauges on / off

»set point«

- Display of the switching function parameters

»set up«

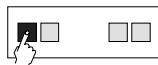
- Display of the unit parameters
- Modification of the unit parameters



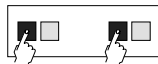
4.4 Overview of key entries

»sensor« mode

(Pressure measurement)



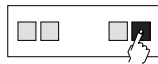
Select measuring circuit



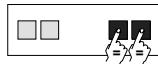
Switch on selected gauge



Switch off selected sensor



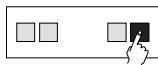
Change to »set point« mode



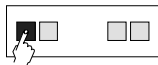
Change to »set up« mode

»set point« mode

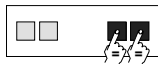
(Switching function parameter inquiry)



Select next switching function in
»set point«



Change to »sensor« mode



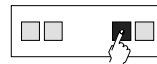
Change to »set up« mode

»set up« mode

(Parameter inquiry, parameter selection)



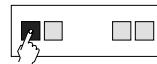
Select next group in »set up«



Select next function in »set up« if existing



Modify the selected parameter



Change to »sensor« mode



In order to avoid unintentional entries, certain operations require combined key activation (→ operating information on front panel). It is important, however, that <sensor> or <set point> are not pushed before the other keys, otherwise the basic function will be executed.

4.5 »sensor« mode

The TPG 300 is in »sensor« mode

- after being switched on
- after the <sensor> key has been pushed
- one minute after the last keystroke in »set point« mode

4.5.1 Switching the measuring circuit on / off

Each individual measuring circuit can be manually switched on or off (after entering the code with <step> and <funct>)

Manual on/off-switching has priority over the automatic control.

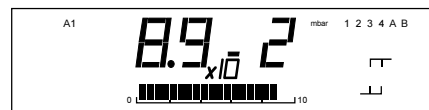


Switch on cold cathode gauges at pressures $<10^{-3}$ mbar only, in order to prevent excessive contamination of the gauges.

When the cold cathode measuring circuit is switched on, the LED «PE» on the front panel lights up.

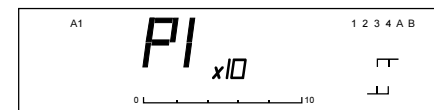
Measuring circuit on

Measured value



Measuring circuit off

Plug-in board identification



Pirani gauges are not deactivated by switching them off, only their measuring results and the error message are suppressed.

Switching off the cold cathode gauge helps to prevent it from becoming contaminated.

4.5.2 Measurement range violation

If the measured value is outside the measuring range of the measuring circuit, this will be indicated if the corresponding measuring circuit is selected.

If the cold cathode measuring circuit is controlled by another measuring circuit, the display changes over automatically.

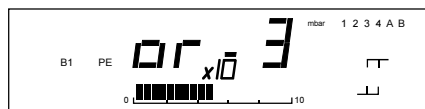


If the upper measuring range limit is exceeded, the cold cathode gauge can become contaminated if it remains switched on.

If the under range control is switched off (→ section 4.7.5) the system cannot distinguish between a gauge failure, cable interruption and underrange of a cold cathode measuring circuit. «ur» is displayed in all cases.

Measuring circuit on

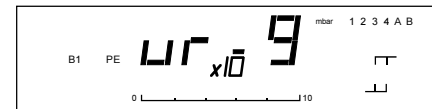
Overrange



Overrange: «or» and exponent indicating the range limit

Measuring circuit off

Underrange



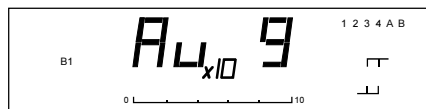
Underrange: «ur» and exponent indicating the range limit

4.5.3 Automatic measuring circuit switchover

If a measuring circuit is controlled by another measuring circuit and either one is selected, the display automatically changes over

- when the measured value drops below the lower threshold
- when the measured value exceeds the upper threshold.

Measured value or e.g.



Automatic control: «Au», cold cathode measuring circuit waits for the fulfillment of the power on condition by the Pirani measuring circuit.

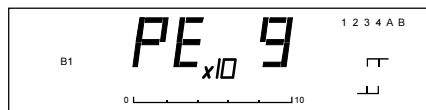
4.5.4 Self-monitoring

If the cold cathode measuring circuit is self-monitored, it automatically switches off

- when the measured value exceeds the upper threshold.

The measuring circuit must be restarted manually. Restarting can be prevented by another measuring circuit (e.g. Pirani).

Measured value or e.g.



4.5.5 Plug-in board identification

When the measuring circuit is switched off, its identification is displayed (→ section 4.5.1).

Main display	Meaning
«Au 9»	Cold cathode measuring circuit 5×10^{-9} mbar automatic operation
«Au 10»	Cold cathode measuring circuit 1×10^{-10} mbar automatic operation
«Au 11»	Cold cathode measuring circuit 10^{-11} mbar automatic operation
«PE 9»	Cold cathode measuring circuit 5×10^{-9} mbar
«PE 10»	Cold cathode measuring circuit 1×10^{-10} mbar
«PE 11»	Cold cathode measuring circuit 10^{-11} mbar
«PI »	Pirani measuring circuit
«PI I »	Pirani measuring circuit for long cables
«PI n»	Pirani measuring circuit for nickel filament
«PI ln»	Pirani measuring circuit for long cables and nickel filament

4.6 »set point« mode

Selecting the »set point« mode

- Push the <set point> key (only possible in »sensor« mode)
- The bar graph display extinguishes

Quitting the »set point« mode

- Select another mode or
- Wait a minute after the last key was pushed. The TPG 300 then switches automatically back to »sensor« mode (measuring mode)

With <set point> you can read cyclically the threshold values and assignments of the switching functions.

Assignment of switching function to measuring circuit



The function of the measuring circuits is not influenced.

The current status of the switching functions is not displayed, but they work nevertheless.

With <set up> you can go directly to the »select threshold« function of the »set up« mode to change the displayed threshold value.

4.7 »set up« mode

Selecting the »set up« mode

- Simultaneously push the <funct> and <group> keys
- Enter the code with <step> and <funct> if required
- The bar graph display extinguishes

Quitting the »set up« mode

- Push the <sensor> key

4.7.1 Parameter inquiry / modification

The parameters are organized in two levels (groups <group> and functions <funct>).




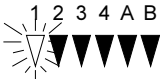



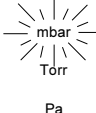



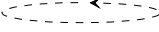

Select the parameter to be displayed in the »set up« mode

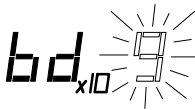

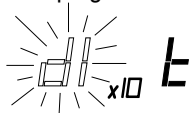
- Push the <group> or <funct> key
- Modify the parameter by pushing the <step> key

4.7.2 Parameter overview

Comments to the following table:

- Groups, functions or parameters which do not exist because of the unit configuration will be bypassed.
- **Inputs** in groups, functions and parameters **always work cyclically**. In case of error, simply go ahead up to the right spot again.
- The pictures shown in the table correspond to the first function of each group.

Group  <group>	Function  <funct>	Parameter values  <step>
Switching functions 	Switching function selection Threshold selection Threshold 1st digit mantissa Threshold 2nd digit mantissa Threshold exponent Measuring circuit assignment	 1, 2, 3, 4, A, B lower, upper 1 ... 9 0 ... 9 -11 ... +3 A1, A2, B1, B2, – (none)
PE measuring circuit underrange control 	Control	 0 (disabled) 1 (enabled)
Measurement unit 	Measurement unit selection	 mbar, Torr, Pa
Filter  	Filter assignment Filter time constant	 A1, A2, B1, B2  1 (fast) 2 (medium) 3 (slow)


<p>Interface</p> 	<p>Baud rate</p>	<p>3 (300) 1 (1200) 2 (2400) 4 (4800) 9 (9600)</p>
<p>Parameter storage</p> 	<p>Parameter program selection</p> <p>Code</p> <p>Code</p>	<p>u (user) 00 0 ... 99 19 H (hotstart) 00 0 ... 99 19 d (default)</p>
<p>Test programs</p> 	<p>Test program selection</p> <p>Channel selection</p> <p>Test</p>	<p>Time for consideration</p> <p>dl (display) rA (RAM) EP (EPROM) EE (EEPROM) Ad (A/D converter) A0 .. A7 lo (keys) rS (interface) Pn (program number) t (test start)</p>

4.7.3 Default parameters

The default parameters are summarized in the following table. In the 'User' column, you can enter your own parameter set.

Parameter		Default	User	User
Lower threshold	Switching function 1	1.0×10^{-11} mbar		
	Switching function 2	1.0×10^{-11} mbar		
	Switching function 3	1.0×10^{-11} mbar		
	Switching function 4	1.0×10^{-11} mbar		
	Switching function A	6.0×10^{-3} mbar		
	Switching function B	6.0×10^{-3} mbar		
Upper threshold	Switching function 1	9.0×10^{-11} mbar		
	Switching function 2	9.0×10^{-11} mbar		
	Switching function 3	9.0×10^{-11} mbar		
	Switching function 4	9.0×10^{-11} mbar		
	Switching function A	8.0×10^{-3} mbar		
	Switching function B	8.0×10^{-3} mbar		
Measuring circuit assignment	Switching function 1	– (none)		
	Switching function 2	– (none)		
	Switching function 3	– (none)		
	Switching function 4	– (none)		
	Switching function A	– (none)	*)	*)
	Switching function B	– (none)	*)	*)

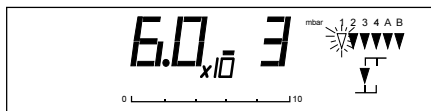
Parameter		Default	User	User
PE Underrange control		0 (disabled)		
Unit of measurement	mbar			
Filter time constant	Measuring circuit A1	2 (medium)		
	Measuring circuit A2	2 (medium)		
	Measuring circuit B1	2 (medium)		
	Measuring circuit B2	2 (medium)		
Baud rate		9 (9600)		
Immediate start-up	Measuring circuit A1	- (no)		
	Measuring circuit A2	- (no)		
	Measuring circuit B1	- (no)		
	Measuring circuit B2	- (no)		
Code		00 0 (unlocked)		

- *)  For measuring circuit assignments configured at the factory as user parameters for units with medium and high vacuum measuring circuits that are ready for operation → section 3.2.1.

4.7.4 »Switching functions« group

a) »Switching function selection« function

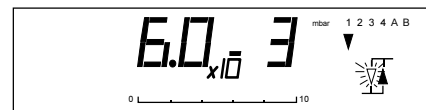
Switching functions 1 to 4 affect the relays of an interface plug-in board (accessory). A and B can control the on/off switching of the cold cathode gauge heads.



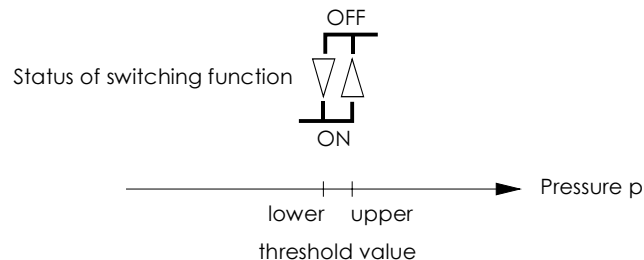
Switching function	Affects
1	Interface plug-in board relay 1
2	Interface plug-in board relay 2
3	Interface plug-in board relay 3
4	Interface plug-in board relay 4
A	Cold cathode measuring circuit(s) in slot A
B	Cold cathode measuring circuit(s) in slot B


b) »Threshold selection« function

Defining an upper and a lower threshold defines a hysteresis for each switching function.



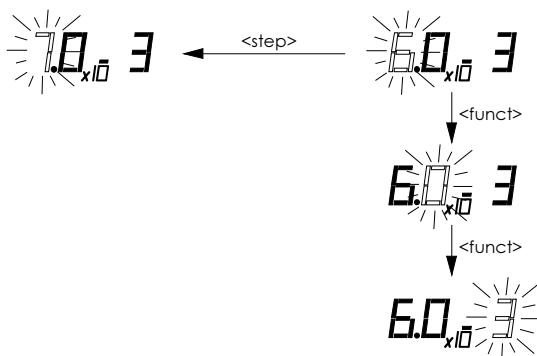
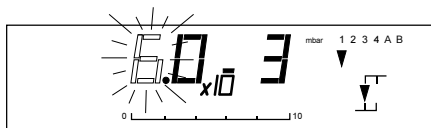
When the pressure is dropping, the status changes to »on« at the lower threshold and to »off« at the upper threshold.




 Hysteresis Δp is a minimum of 10% of the lower threshold. This prevents unstable states.

If you set the upper threshold too low, the minimum hysteresis will go into effect automatically.


c) »Threshold setting« function

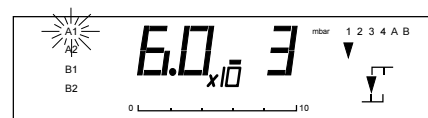


 Modifications only become effective when the switching function, group or operating mode is changed.


d) »Measuring circuit assignment« function

Any of the switching points can be assigned to any of the measuring channels.

 Changing the assignment can trigger a change in the switching function status.



The cycle depends on the plug-in boards installed.

 Available measuring circuits are indicated by an LED. The upper and lower thresholds of switching functions 1 ... 4 cannot be assigned to different measuring circuits. The last entry made applies.

The upper and lower thresholds of switching functions A and B can be assigned to different measuring circuits (→ section 4.5.4).

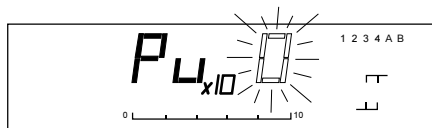
The LED for the assigned measuring circuit flashes.

It is possible to leave a switching function unassigned (no measuring circuit LED will flash). The switching function is ineffective.

Modifications only become effective when the switching function, group or operating mode is changed.

4.7.5 »PE measurement underrange control« group

The behavior of switching functions assigned to the cold cathode measuring circuit (PE) can be adjusted when underrange occurs (→ section 4.5.2) (except in the case of self assignment).



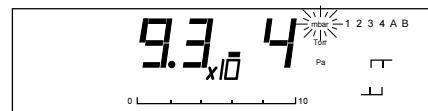
Display	Meaning
Pu 0	»UnderRng« is interpreted as valid measured value; the switching function remains »on«
Pu 1	»UnderRng« is interpreted as an error; the switching function changes to »off«. The switching function does not change to »on« until the measured value has remained within the measurement range of the cold cathode measuring circuit for at least 10 seconds.



Cold cathode measuring circuits for 10^{-11} mbar sometimes require more than 10 seconds for the transition «OverRng» ⇒ «UnderRng» and thus lead the switching function being »on« for a short time.

4.7.6 »Measurement unit« group

Select the desired measurement unit:



The modification is made immediately.

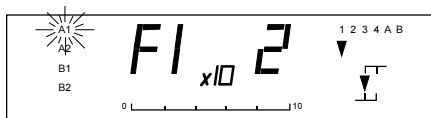
The threshold values for the switching functions are adapted automatically.

4.7.7 »Filter« group

In the event of fast varying measurement signals, the measured values can be filtered to stabilize both, the display and the switching functions.

a) »Filter assignment« function


You can set the filter separately for each individual measuring circuit.

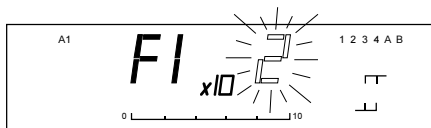


The cycle depends on the plug-in boards installed.

b) »Filter time constant« function

Three filter time constants are available.

 In the case of signal fluctuations, a faster filter can cause 'fluttering' of switching functions.



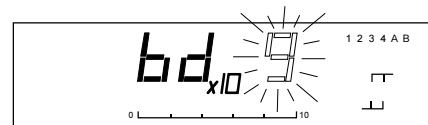
Display	Filter	Time constant
FI 1	fast	16 ms
FI 2	medium (default)	160 ms
FI 3	slow	1.6 s

 Any modification is made immediately.


The analog outputs are not affected.

4.7.8 »Interface« group

a) »Baud rate« function



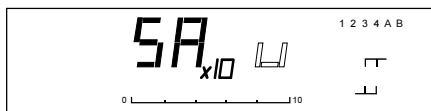
Display	Baud rate
bd 3	300
bd 1	1200
bd 2	2400
bd 4	4800
bd 9	9600 (default)

 The baud rates for the TPG 300 and any interfaced computer must be the same.

4.7.9 »Parameter storage« group

The stored parameters are activated when the TPG 300 is switched on. If no parameters have been stored, the unit defaults to the standard parameter set given in section 4.7.3.

a) »Parameter set« function



You can either select your own set of parameters (user) or the default set to be saved.

Display	Meaning
SA u	Save user parameters (SA ve u ser)
SA H	Save user parameters with immediate start-up
SA d	(SA ve H otstart)
	Save default (factory set) parameters(SA ve d e-faults)



By activating the immediate start-up, a measuring circuit can be automatically re-enabled after a power failure. This is particularly useful in the case of self-monitoring.

The immediate start-up is jointly activated for all measuring circuits. The measuring circuit must however be switched on during storage.

At «SA u» and «SA H», the unit can be locked by a code number (→ following section).

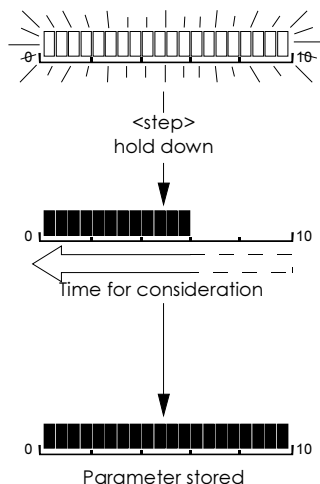
b) »Save« function



Saving the default parameters has the following effects:

- The switching function assignments are lost.
- The relays are de-energized, i.e. the switching functions change to »off«.
- Communication with a computer may no longer be possible.





If «SA U» or «SA H» is selected (store user parameters), you will be asked to enter a code before storage takes place. This is a protection against inadvertent or unauthorized manipulations on the operating states of the sensors or the parameters. In this mode the unit may be unlocked in the same way.

If you do not wish to modify the lock, then push <funct> three times.

Pushing <step> until the bar graph is completely dark causes the parameters to be stored. When the storage process is finished, the bar graph lights again.

After storing, your unit will work with the newly stored parameter set.

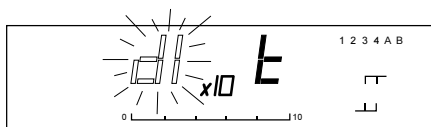
If you release <step> before the bar graph is completely dark (time for consideration), nothing will be stored.

- | | |
|-------------|-----------------------------------------------------------------------------------------|
| Code 0 | TPG can be operated without entering a code |
| Code 1–1998 | TPG can be operated when a corresponding code is entered |
| Code 1999 | TPG can be operated only when this particular code is entered (code cannot be modified) |

4.7.10 »Test programs« group

Tests marked with * are carried out automatically when the TPG 300 is switched on. You can also run all tests during operation. They do not influence measurements and switching functions.

a) »Test program selection« function



Display	Tested part
dl *	Display
rA *	RAM
EP *	EPROM
EE *	EEPROM
Ad	A/D converter
A0	Channel 0
A1	Channel 1
A2	Channel 2
A3	Channel 3
A4	Channel 4
A5	Channel 5
A6	Channel 6
A7	Channel 7
lo *	Keys
rS	RS-232-C interface
Pn	Program number



The display test lights first all LEDs together and then individually.

The RAM routine tests the two kByte of the RAM.

A check sum is formed and controlled in both, the EPROM and EEPROM test.

You must enter the channel (0 ... 7) when running the A/D converter test. A/D input voltage = display × 5 mV.

«lo» checks whether any key contact is stuck.

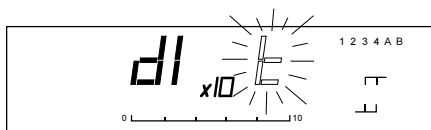
«rS» echoes HOST characters coming from the host. It displays them in the Hex format in the mantissa field and their number in the exponent field.

«Pn» gives a read-out of your program number.

b) »Test« function

Start the chosen routine with <step>.

Any errors found are reported (→ 36).



You can always return to »test« by pushing the <func> key.

The «dl», «Ad», «rS», and «Pn» routines run continually and must be stopped by pushing <func> or <group>. All the other tests run through once. When they are finished, a line appears in the exponent display.

You can stop the «dl» by pushing <step> and start it again as often as you like.

c) »Program version« function

BG 509 780 -F



Modification index

You can read out the program version of your unit by conducting the corresponding test (Pn).

A program with a higher modification index will eventually provide additional services.

This operating manual is not valid for a more recent program number.

5 Technical data

5.1 Mains power connection

Voltage	100 ... 240 VAC \pm 10%
Frequency	50 ... 60 Hz
Power consumption	60 VA
Fuses	F1, F2: 1,25 AT, 250 V, Ø5×20 mm

5.2 Ambiance conditions

The following data apply to all assemblies in the TPG 300 unless otherwise indicated.

Admissible temperature

Storage	−40 °C ... +65 °C
Operation	
rack installation	+ 5 °C ... +50 °C
bench-top unit	+ 5 °C ... +40 °C
	+ 5 °C ... +50 °C (with cover / hinged feet)

Relative humidity	max. 80% at temperatures up to +31 °C decreasing to 50% at +40 °C
-------------------	-------------------------------------------------------------------


Use	indoors only
	Height up to 2000 m


Protection	IP 40
------------	-------

Safety	EN 61010: 93 (IEC 1010: 90 + A1: 92) Class I, Pollution degree 2
--------	---------------------------------------------------------------------

EMC	Emission EN 50081 -1: 92
	Immunity EN 50082 -2: 95

5.3 Basic unit

Measurement range	depending on the measurement plug-in boards used →  [3]
-------------------	--------------------------------------------------------------------------------------------------------------------------------------------

Length of gauge cable	depending on the measurement plug-in boards used →  [3]
-----------------------	--------------------------------------------------------------------------------------------------------------------------------------------

Measurement rate	100 per s
------------------	-----------

Display rate	5 per s
--------------	---------

Filter time constant

FI 1 (fast)	approx. 16 ms
FI 2 (medium)	approx. 160 ms
FI 3 (slow)	approx. 1.6 s

Displays

Measured value digital	15 mm 7 segment display
Mantissa	2 position
Exponent	1½ position

Measured value analog	20 position LED bar
-----------------------	---------------------

Status	17 LEDs
--------	---------

Error message	1 LED, red
---------------	------------

Slots for

measurement plug-in boards	2 (slots A and B)
interface plug-in boards	1 (slot C)

Compatible measurement plug-in boards

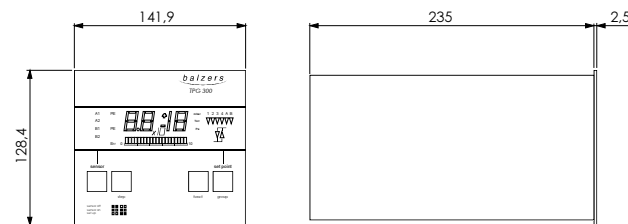
Pirani	PI 300D, PI 300DL,	PI 300DN PI 300DLN
Cold cathode	PE 300C9, PE 300T10, PE 300DC9,	PE 300C10 PE 300T11 PE 300DT9
Combined Pirani / cold cathode	CP 300C9, CP 300T9L, CP 300C10, CP 300T10, CP 300T10L, CP 300T11, CP 300T11L,	CP 300C9N CP 300T9LN CP 300C10N CP 300T10N CP 300T10LN CP 300T11N CP 300T11LN

Compatible interface plug-in boards

IF 300A,	IF 300B,	IF 300C
----------	----------	---------

5.4 Dimensions and weight

Dimensions



Weight

1.35 kg (without plug-in boards)

5.5 Plug-in boards

Technical data of the compatible measurement and interface plug-in boards → [3].



Before you connect any external elements, check that they are compatible with the technical data.

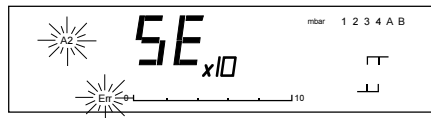
6 Error messages, troubleshooting









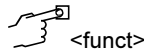
Manipulations inside the unit that are not described in this operating manual may only be performed by a Balzers Service Center.

6.1 Error messages

An error message is indicated by a lighting or flashing «Err» LED.



Display	Possible cause	Correction
«dt» ³⁾	Watch Dog timer – overflow due to strong external influence (electromagnetic)	 <func> If this error occurs frequently, replace the basic unit
«EE» ³⁾	Error during parameter reading	Store default or user parameters(→ section 4.7.9)
	EEPROM defective	
«EP» ³⁾	EPROM defective	
«ld» ³⁾	Operating system overloaded	 <func>
«IF» ³⁾	Interface plug-in board in slot A or B	Put the interface plug-in board into slot C ²⁾

Display	Possible cause	Correction
«Io» ³⁾	Key pushed	Release key
	Key stuck	
«rA» ³⁾	RAM defective	
«rS» ³⁾	Transmission or programming error	Correct interface parameter or cable, program
	Interface defective	Replace interface plug-in board ²⁾
«SE» ⁴⁾	TPR gauge not connected	Connect gauge
	Break in TPR cable	Replace cable
	TRR gauge defective	Replace gauge
«So» ³⁾	Stack overflow	



- 2) Please read the information in section 3.2.2 before performing any manipulations on the plug-in boards.

3) Fatal error

4) Fault in measuring circuit (LED of the corresponding measurement circuit flashes)

6.1.1 Contact setting of the relays in the event of a fault

The relays on the IF 300A, IF 300B, and IF 300C plug-in boards behave as follows when a fault occurs:

A contact 1...4 (switching function) is de-energized in the event of:

- a fault in the assigned measuring circuit
- a fatal error

Contact 5 (Error status) is de-energized in the event of:

- a fault in a measuring circuit
- a fatal error





Additional information on relay contact states →  [3].

6.2 Troubleshooting

6.2.1 Installation problems

Problem	Possible cause	Correction
The control unit cannot be installed into the rack	Old rack system	Use a rack mount adapter according to DIN 41 494 (→ section 9.6)

6.2.2 Operating and calibration problems


Problem	Possible cause	Correction
No display appears when the unit is switched on	Unit switched off for too short a period of time	After switching the unit off, wait approx. 10 seconds before restarting
Pressure display unstable	Filter time constant too low	Increase the filtering (→ section 4.7.7)
Switching functions (relays) flutter	Hysteresis too small	Modify the threshold values (→ section 4.7.4) Increase the filtering (→ section 4.7.7)
Pirani pressure display too high	Pirani gauge contaminated	Calibrate the measuring circuit Clean the gauge (→  [4] ... [6]) Replace the gauge
Pirani measurement circuit cannot be calibrated	Combination measurement plug-in board / gauge cable / gauge is not compatible	Select correct combination (→  [3])
	Pirani gauge severely contaminated	Clean the gauge (→  [4] ... [6]) Replace the gauge
Cold cathode pressure display too high	Contaminated or moist connector insulation	Clean or replace connector
	Humidity (⇒ leak current)	Keep humidity low, keep the unit switched on
Cold cathode pressure display too low	Cold cathode gauge contaminated	Clean the gauge (→  [7] ... [10])
«no P» is displayed	No plug-in board has been installed	Install the appropriate plug-in board ²⁾
Incomprehensible display	Plug-in board not screwed down	Tighten the screws
	Contacts contaminated / bent	Clean / carefully straighten contacts ²⁾

Problem	Possible cause	Correction
Unit cannot be locked	Code 99 19 activated	<ol style="list-style-type: none"> 1. Pull the measurement plug-in boards approx. 1 cm out of the slots A and B ²⁾ 2. Change the code in »set up« mode 3. Reinstall the measurement plug-in boards ²⁾
Code forgotten	---	<ol style="list-style-type: none"> 1. Pull the measurement plug-in boards approx. 1 cm out of the slots A and B ²⁾ 2. Select the code in »set up« mode 3. Read out the code 4. Reinstall the measurement plug-in boards ²⁾



²⁾ Please read the instructions in 3.2.2 before performing any manipulations on the plug-in boards.

6.2.3 Failures

Problem	Possible cause	Correction
No display appears when the unit is switched on	No mains power	Check mains
	Fuse defective	Replace fuse (→ section 6.2.4)
Individual LEDs, or segments of the 7-segment or bar graph display do not light	Display / microprocessor defective	

6.2.4 Replacing the apparatus fuses

The fuses are located inside the unit on the power supply board.



Procedure

- Switch the unit off and wait one minute
- Remove all cables (mains last)
- Unscrew the back panel
- Pull out the back panel together with the plug-in boards just far enough to make the fuses accessible
- Replace the fuses

Make sure to replace fuses with fuses of the recommended type and nominal current strength (→ 62). It is not permissible to use mended fuses or to short circuit the fuse holder.

- Reassemble in reverse order



Put the screw lockings in place again and tighten the screws!



If the fuses blow again.

7 Maintenance

The total pressure gauge and controller TPG 300 requires no maintenance. For maintenance of the gauges, refer to the respective documents [4] ... [10].



Turn the unit off and remove all cables (the mains cable last) before doing any of the work described below.

For cleaning the outside of the unit, a slightly humid cloth will usually do. Do not use under any circumstances an aggressive or scouring leaning agent. No water must get into the unit! Before putting the unit into operation again, allow it to dry thoroughly.



In a very dusty environment, the dust inside the unit should be periodically removed. Carefully remove the dust with dry compressed air.

7.1 Aligning the Pirani measurement circuits

→ [3]

7.2 Changing the EPROM

For updated firmware versions, the EPROM must be changed. Please contact your nearest Balzers partner to inquire about the most recent update.



Disconnect all cables from the unit before changing the EPROM.



Protect the EPROM and the electronics of the TPG 300 from static electricity.



Procedure

1. Store default values (→ 30).
2. Switch the unit off and wait one minute.
3. Detach all cables from the unit (mains cable last).
4. Unscrew the front panel assembly and remove it (fig. 1).
5. Carefully remove the old EPROM.
6. Install the EPROM (correct polarity: fig. 2).
7. Carefully slide the front panel assembly back, plug it in, and screw it down.
8. Re-attach all cables (mains cable first).
9. Switch the unit on again.

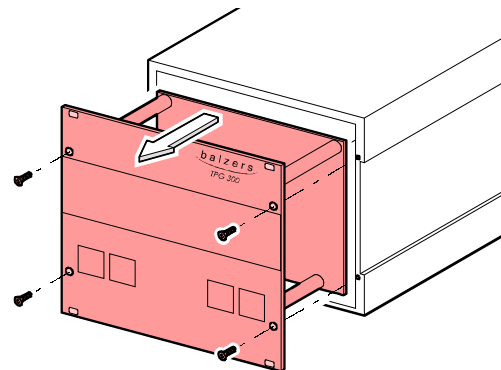


Fig. 1

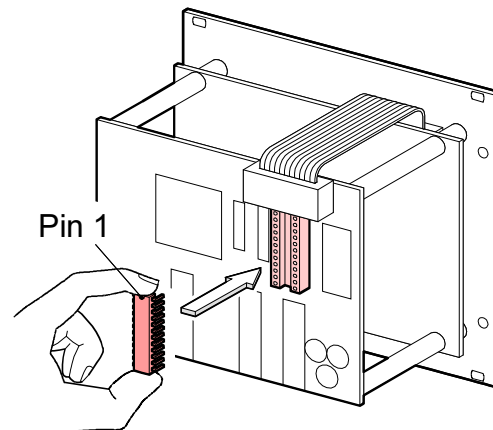


Fig. 2

8 RS-232-C interface

The serial interface allows communication between the TPG 300 and a computer. A terminal can also be connected for test purposes.

8.1 Installation and connection diagram

→  [3]

8.2 Data transmission

Information is exchanged bi-directionally, i.e. the data and control commands can flow in either direction.

8.2.1 Definitions

The following abbreviations and symbols are used:

Symbol	Meaning			
HOST	Computer or terminal			
[...]	Non mandatory elements			
ASCII	American Standard Code for Information Interchange			
			ASCII	
			Dec.	Hex.
<ETX>	END OF TEXT (CTRL C)	Reset of interface	3	03
<CR>	CARRIAGE RETURN	Carriage return	13	0D
<LF>	LINE FEED	Line feed	10	0A
<ENQ>	ENQUIRY	Request to send	5	05
<ACK>	ACKNOWLEDGE	Positive confirmation	6	06
<NAK>	NEGATIVE ACKNOWLEDGE	Negative confirmation	21	15

"Send": Transfer from HOST to TPG 300

"Receive": Transfer from TPG 300 to HOST

8.2.2 Flow control

After each ASCII string the HOST must wait for a confirmation (<ACK> or <NAK> <CR><LF>) to ensure that the input buffer is empty.

The input buffer of the HOST must have a capacity of at least 32 bytes.

8.2.3 Communication protocol

Send format

Messages are transmitted to the TPG 300 as ASCII strings in the form of mnemonics and parameters. All mnemonics comprise three ASCII characters.

Spaces are ignored. <ETX> (CTRL C) clears the input buffer in the TPG 300.

The input is terminated by <CR> or <LF> or <CR><LF> ("end of message"), and evaluation in the TPG 300 is subsequently started.

The tables in section 8.3 are applicable to the mnemonics and parameters. The maximum number of digits, the data format and admissible value ranges are also specified there.

Send protocol

HOST	TPG 300	Explanation
Mnemonics [and parameters] —>		Receives message with
<CR>[<LF>]		"end of message"
<————— <ACK><CR><LF>		Positive acknowledgment of a received message

Receive format

When required with a mnemonic, the TPG 300 transmits the measurement data or parameters as an ASCII strings to the HOST.

<ENQ> must be sent to request the transmission of an ASCII string. Additional strings, according to the last selected mnemonic, are read out by repetitive transmission of <ENQ>.

If <ENQ> is received without a valid request, the ERROR word is transmitted.

Receive protocol

HOST	TPG 300	Explanation
Mnemonics [and parameters] —>		Receives message with
<CR>[<LF>]		"end of message"
<————— <ACK><CR><LF>		Positive acknowledgment of a received message
<ENQ> —————>		Request to send data
<—Measured values or parameters		Transmits data with "end of message"
<————— <CR><LF>		
<ENQ> —————>		Request to send data
<—Measured values or parameters		Transmits data with "end of message"
<————— <CR><LF>		

Error processing

The received strings are validated in the TPG 300. If an error is detected, a negative acknowledgment <NAK> is output. A corresponding flag is set in the ERROR word. Errors can be decoded after the ERROR word has been read.

Error recognition protocol

HOST	TPG 300	Explanation
Mnemonics [and parameters]	—>	Receives message with
<CR>[<LF>]	—————>	"end of message"

***** Transmission or programming error *****

<—————	<NAK><CR><LF>	Negative acknowledgment of a received message
Mnemonics [and parameters]	—>	Receives message with
<CR>[<LF>]	—————>	"end of message"
<—————	<ACK><CR><LF>	Positive acknowledgment of a received message

8.3 Mnemonics

SEN	Sensor On/Off	Measuring channel on/off
PA1	Pressure sensor A1	Pressure measuring circuit A1
PA2	Pressure sensor A2	Pressure measuring circuit A2
PB1	Pressure sensor B1	Pressure measuring circuit B1
PB2	Pressure sensor B2	Pressure measuring circuit B2
PUC	PE underrange control	PE Underrange control
SP1	Set point 1	Switching function 1
SP2	Set point 2	Switching function 2
SP3	Set point 3	Switching function 3
SP4	Set point 4	Switching function 4
SPA	Set point A	Switching function A
SPB	Set point B	Switching function B
SPS	Set point status	Switching function status
UNI	Unit of measurement	Pressure
FIL	Filter time constant	Filter time constants
BAU	Baud rate	
SAV	Save parameters	Store set of parameters
COD	Code lock	Operation disabling (Code)
PNR	Program number	Program version
TID	TPG Identification	TPG identification (plug-in boards)
ERR	Error status	

8.3.1 Measured values

Measuring circuit on/off

Send : **SEN** [, x, x, x, x] <CR> [<LF>] Sensor on/off

				Measuring circuit B2	x = 0 → no measuring channel
				Measuring circuit B1	1 → off
				Measuring circuit A2	2 → automatic
				Measuring circuit A1	3 → on

Receive : <ACK><CR>

Send : <ENQ>

Receive : x, x, x, x <CR><LF>

				Status measuring circuit B2
				Status measuring circuit B1
				Status measuring circuit A2
				Status measuring circuit A1

Pressure measurement

Send : **Pxx** <CR> [<LF>] Pressure sensor

	A1	Pressure measuring circuit A1
	A2	Pressure measuring circuit A2
	B1	Pressure measuring circuit B1
	B2	Pressure measuring circuit B2

Receive : <ACK><CR>

Send : <ENQ>

Receive : x, x.xxxEsxx <CR><LF>

├── Measured value 1.0E-11 to 1.4E+3
└── Status x = 0 → Measurement data okay
 1 → Underrange
 2 → Overrange
 3 → Measuring circuit error
 4 → Measuring circuit switched off
 5 → No hardware

PE underrange control

Send : PUC [, x] <CR> [<LF>] PE underrange control

└── Control x = 0 → off
 1 → on

Receive : <ACK><CR>

Send : <ENQ>

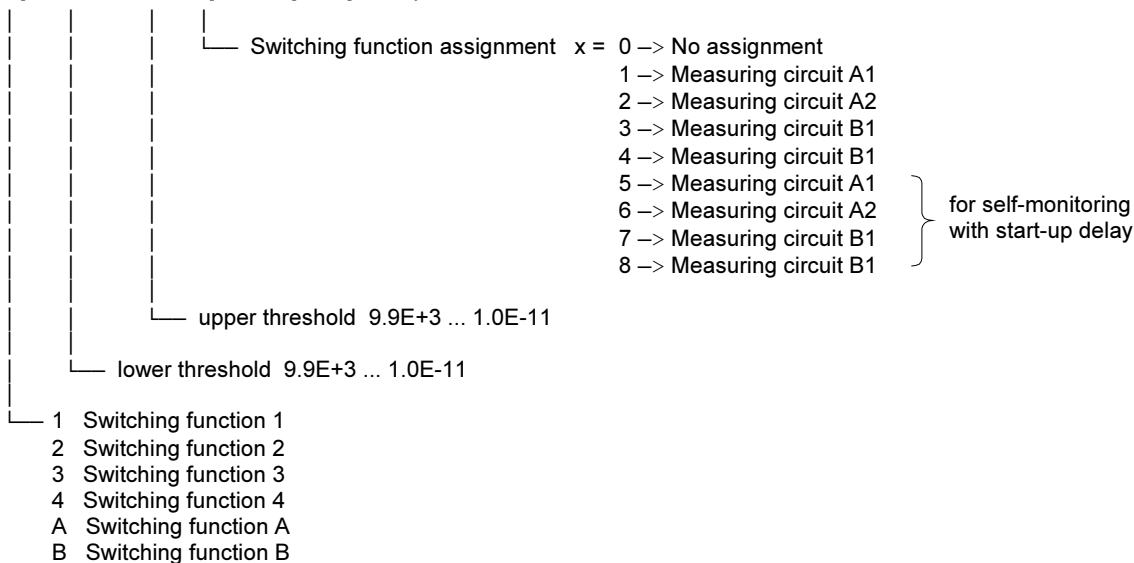
Receive : x <CR><LF>

└── Underrange control

8.3.2 Switching functions

Threshold setting, assignment

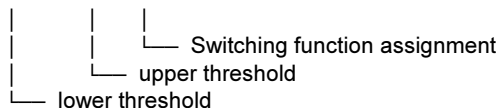
Send : **SPx** [,x.xEsxx, x.xEsxx, x] <CR> [<LF>] Set point



Receive : <ACK><CR>

Send : <ENQ>

Receive : x.xEsxx, x.xEsxx, x <CR><LF>



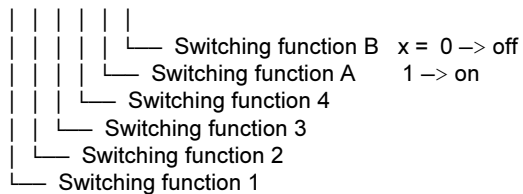
Switching function status

Send : **SPS** <CR> [<LF>] Set point status

Receive : <ACK><CR>

Send : <ENQ>

Receive : x, x, x, x, x, x <CR><LF>



8.3.3 Display

Unit of measurement, pressure

Send : **UNI** [, x] <CR> [<LF>] Unit of measurement

 |
 └─ Unit of measure x = 1 → «mbar»
 2 → «Torr»
 3 → «Pa»

Receive : <ACK><CR>

Send : <ENQ>

Receive : x <CR><LF>

 |
 └─ Unit of measurement

8.3.4 Filter time constants

Send : **FIL** [, x, x, x, x] <CR> [<LF>] Filter time constant

```

      | | | |
      | | | └─ Measuring circuit B2 x =      1 → fast
      | | └─ Measuring circuit B1 2 → medium
      | └─ Measuring circuit A2  3 → slow
      └─ Measuring circuit A1
  
```

Receive : <ACK><CR>

Send : <ENQ>

Receive : x, x, x, x <CR><LF>

```

      | | | |
      | | | └─ Filter measuring circuit B2
      | | └─ Filter measuring circuit B1
      | └─ Filter measuring circuit A2
      └─ Filter measuring circuit A1
  
```

8.3.5 Baud rate

Send : **BAU** [, x] <CR> [<LF>] Baud rate

 |
 └─ Baud rate x = 3 → 300 baud
 1 → 1200 baud
 2 → 2400 baud
 4 → 4800 baud
 9 → 9600 baud

Receive : <ACK><CR><LF>

Send : <ENQ>

Receive : x <CR><LF>

 |
 └─ Baud rate

8.3.6 Storing

Send : **SAV** [, x] <CR> [<LF>] Save parameters

 |
 └─ Set of parameters x = 0 → Default parameters
 1 → User parameters
 2 → User parameters with immediate start-up (users hotstart)

Receive : <ACK><CR><LF>

Send : <ENQ>

Receive : x <CR><LF>

 |
 └─ Set of parameters

8.3.7 Auxiliary functions

Authorized access (Code)

Send : **COD** [, xxxx] <CR> [<LF>] Code lock

└─ Code key x = 0 → TPG can be operated without entering a code
 1 – 1998 → TPG can be operated when a corresponding code is entered
 1999 → TPG can be operated only when this particular code is entered
 (code cannot be modified)

Receive : <ACK><CR><LF>

Send : <ENQ>

Receive : xxxx <CR><LF>

└─ Code key

Program version

Send : **PNR** <CR> [<LF>] Program number

Receive : <ACK><CR>

Send : <ENQ>

Receive : BG xxxxxx-- <CR><LF>

└─ Program version

Plug-in board identification

Send : **TID** <CR> [<LF>] TPG identification

Receive : <ACK><CR>

Send : <ENQ>

Receive : x, x, x <CR><LF>

 | | |
 | | | └─ Identification slot C
 | | └─ Identification slot B
 | └─ Identification slot A x = i.e.

NO P (no plug-in board)
PI300 DL

Test programs

for Balzers Service

8.3.8 Error messages**Error status**

Send : **ERR** <CR> [<LF>] Error status

Receive : <ACK><CR>

Send : <ENQ>

Receive : xxxx <CR><LF>

```

      |
      └─ x = 0000 → no error
            1000 → TPG error (see display on the front panel)
            0100 → NO HWR    Hardware not installed
            0010 → PAR       Invalid parameter
            0001 → SYN       Syntax error
    
```

The ERROR word is erased as it is read out. It is automatically reset if the error persists.

Example

"Send (S)" and "Receive (E)" are referenced to the host.

S:	TID <CR> [<LF>]	Request for TPG identification
E:	<ACK> <CR> <LF>	Positive acknowledgment
S:	<ENQ>	Inquiry
E:	PI 300DL, PE 300-10, IF 300 <CR> <LF>	Plug-in board types
S:	SEN <CR> [<LF>]	Request for sensor status
E:	<ACK> <CR> <LF>	Positive acknowledgment
S:	<ENQ>	Inquiry
E:	3, 3, 1, 0 <CR> <LF>	Sensor status
S:	SPB <CR> [<LF>]	Request for parameter of switching function B
E:	<ACK> <CR> <LF>	Positive acknowledgment
S:	<ENQ>	Inquiry
E:	1.0E-11, 9.0E-11, 0 <CR> <LF>	Threshold values and assignment
S:	SPB, 6.8E-3, 9.8E-3, 2 <CR> [<LF>]	Modify threshold values of switching function B
E:	<ACK> <CR> <LF>	Positive acknowledgment

S:	FOL, 3, 2, 2, 2 <CR> [<LF>]	Modify filter value (syntax error)
E:	<NAK> <CR> <LF>	Negative acknowledgment
S:	ERR <CR> [<LF>]	ERROR query
E:	0001 <CR> <LF>	ERROR message
S:	FIL, 3, 2, 2, 2 <CR> [<LF>]	Modify filter value
E:	<ACK> <CR> <LF>	Positive acknowledgment
S:	<ENQ>	Inquiry
E:	3, 2, 2, 2 <CR> <LF>	Filter levels
S:	SEN <CR> [<LF>]	Request check of sensor status
E:	<ACK> <CR> <LF>	Positive acknowledgment
S:	<ENQ>	Inquiry
E:	3, 3, 2, 0 <CR> <LF>	Sensor status report
S:	SAV, 1 <CR> [<LF>]	Store modified set of parameters
E:	<ACK> <CR> <LF>	Positive acknowledgment
S:	PA2 <CR> [<LF>]	Pressure measurement measuring circuit A2
E:	<ACK> <CR> <LF>	Positive acknowledgment
S:	<ENQ>	Inquiry
E:	0, 8.3E-3 <CR> <LF>	Status and pressure measurement
S:	<ENQ>	Inquiry
E:	1, 8.0E-4 <CR> <LF>	Status and pressure measurement
S:	PB1 <CR> [<LF>]	Pressure measurement measuring circuit B1
E:	<ACK> <CR> <LF>	Positive acknowledgment
S:	<ENQ>	Inquiry
E:	0, 1.3E-4 <CR> <LF>	Status and pressure measurement

8.4 Examples of programs

The following BASIC program examples may help you to write your own programs. They run on IBM PCs under BASICA.

```

10 REM *****
11 REM  DUPTPG.BAS Daten-Uebertragungs-Protokoll TPG300  7.August 1987 soro
12 REM
13 REM  Creation Date : 7. August 1987
14 REM  Author       : R. Sonderegger  Abt. EEM
15 REM  Version      : V00.01
16 REM  Modification :
17 REM  Contents     :
18 REM  *****
19 REM
20 OPEN "COM1:9600,N,8,,CS,DS,CD" AS #1
21 REM Eroeffnet COM1: mit 9600 bps,keine Paritaet und acht Daten-Bits.
22 REM CTS,DSR und CD werden nicht geprueft.
23 REM
24 ACK$ = CHR$(6): ENQ$ = CHR$(5): LF$ = CHR$(10)
100 LINE INPUT "Mnemonics? ";m$
101 REM Lesen der Nachrichten von der Tastatur, die Kommas(,)
102 REM oder andere Trennzeichen enthalten koennen.
103 IF m$ = "END" THEN GOTO 300
110 PRINT #1,m$
111 REM Sendet die Nachricht zum TPG300.
120 LINE INPUT #1,a$
121 REM Wartet auf die Quittierung der Nachricht.
130 IF INSTR(a$,ACK$) THEN PRINT " Acknowledge"; ELSE GOTO 200
131 REM Bei positiver Quittung.
140 PRINT #1,ENQ$
141 REM Aufforderung zur Datenuebertragung.
150 LINE INPUT #1,mp$

```

```

151 REM Lesen der Messwerte oder Parameter vom TPG300.
160 PRINT "    "+RIGHT$(mp$, (LEN(mp$)-INSTR(mp$,LF$)))
161 REM Anzeige der Messwerte oder Parameter.
190 GOTO 100
200 PRINT "    Negative Acknowledge";
201 REM Bei negativer Quittung.
210 PRINT #1,ENQ$
211 REM Aufforderung zur Uebertragung des Error-Wortes.
220 INPUT #1,e
221 REM Lesen des Error-Wortes vom TPG300.
230 IF e >999 THEN PRINT "    FATAL ERROR"; : E = E-1000
240 IF e >99 THEN PRINT "    NO HARDWARE"; : E = E-100
250 IF e >9 THEN PRINT "    PARAMETER ERROR"; : E = E-10
260 IF e THEN PRINT "    SYNTAX ERROR";
270 PRINT
280 GOTO 100
300 END

```

```

10 REM *****
11 REM  AVMTPG.BAS           Abfrage von Messwerten           7.August 1987 soro
12 REM
13 REM  Creation Date : 7. August 1987
14 REM  Author       : R. Sonderegger  Abt. EEM
15 REM  Version      : V00.01
16 REM  Modification :
17 REM  Contents     :
18 REM  *****
19 REM
20 OPEN "COM1:9600,N,8,,CS,DS,CD" FOR RANDOM AS #1
21 REM Eroeffnet COM1: mit 9600 bps,keine Paritaet und acht Daten-Bits.
22 REM CTS,DSR und CD werden nicht geprueft.
23 REM
30 CLS
40 ACK$ = CHR$(6): ENQ$ = CHR$(5): LF$ = CHR$(10)

```

```

100 LOCATE 1, 47
101 PRINT "BALZERS TPG300    "; TIME$; " soro"
102 LOCATE 10, 1
110 P$ = "PA1"
120 FOR I = 1 TO 4
121 IF I = 2 THEN P$ = "PA2"
122 IF I = 3 THEN P$ = "PB1"
123 IF I = 4 THEN P$ = "PB2"
130 PRINT #1, P$: REM Abfrage der Druck Messstelle.
140 GOSUB 1000: REM Kommunikationsprotokoll
150 PRINT #1, ENQ$; : REM Aufforderung zur Datenuebertragung.
160 INPUT #1, s, m: REM Lesen des Messwertes.
170 IF s THEN PRINT "                "; : GOTO 200: REM Status >0
180 PRINT USING "    \ \=##.#^"; P$; m; : REM Messdaten o.k.
200 NEXT I
300 LOCATE 5, 22
310 PRINT #1, "SPS": REM Abfrage des Waechterstatus.
320 GOSUB 1000: REM Kommunikationsprotokoll
330 PRINT #1, ENQ$; : REM Aufforderung zur Datenuebertragung.
340 INPUT #1, r1, r2, r3, r4, ra, rb: REM Lesen des Status.
350 PRINT USING "R1># R2># R3># R4># RA># RB>#"; r1; r2; r3; r4; ra; rb;
999 GOTO 100
1000 REM *** Kommunikationsprotokoll ***
1010 LINE INPUT #1, a$: REM Wartet auf die Quittierung der Nachricht.
1020 IF INSTR(a$, ACK$) THEN FOR J = 1 TO 200: NEXT J: RETURN: REM Zeit > 2mS (LF)
1021 REM Bei negativer Quittung.
1030 PRINT #1, ENQ$: REM Aufforderung zur Uebertragung des Error-Wortes.
1040 INPUT #1, e: REM Lesen des Error-Wortes vom TPG300.
1050 IF e > 999 THEN PRINT "                FATAL ERROR"; : e = e - 1000
1060 IF e > 99 THEN PRINT " NO HARDWARE"; : e = e - 100
1070 IF e > 9 THEN PRINT "  PARAMETER ERROR"; : e = e - 10
1080 IF e THEN PRINT "          SYNTAX ERROR";
1090 PRINT
2000 END


```

9 Accessories, Spare parts

9.1 Basic unit TPG 300

	Ordering number
Fuse 1,25 AT, 250 V, Ø5×20 mm	B 4666 438
Blank plate for slot A, B	BG 546 903
Blank plate for slot C	BG 546 902
Cover, hinged feet (pair)	BG 549 225 -T


9.2 Plug-in boards

For ordering numbers of the compatible measurement and interface plug-in boards (c.f. section 5.3) →  [3].


9.3 Mains cables

	Ordering number
Mains cable Swiss standard Type 432 2.5 m	B 4564 309 YP
Mains cable Schuko DIN Type 436 2.5 m	B 4564 309 YT
Mains cable USA Type 439.1 2.5 m	B 4564 309 YW
Mains cable UK, GB Type UD 13 AI 2.5 m	B 4564 309 YZ
EU standard appliance connector (for making power cables to suit your own requirements)	B 4707 193 AA

9.4 Gauges

For ordering numbers of the gauges →  [3].

9.5 Gauge cables

For ordering numbers of the gauge cables →  [3].

9.6 Accessories for installation in a rack











	Ordering number
19" rack frame kit DIN 41 494 (3HE, 84TE) for new submodules	BG 544 083 -T
for combination with older units (Balzers standard) without front profile noses, 2 pairs of fixing bars (tapped at 5.08 and 17.5 mm)	BG 544 082 -T
Blank plate 1/2 rack (3HE, 42TE)	BG 544 781 -T
Blank plate 1/3 rack (3HE, 28TE)	BG 544 780 -T
Blank plate 1/6 rack (3HE, 14TE)	BG 544 779 -T

Appendix

A: Information main display

Ad	Test program
Au	Cold cathode measuring circuit automatic control
bd	Baud rate
CP	Pirani / cold cathode circuit (identification)
dt	Error message (Err)
EE	Test program, error message (Err)
EP	Test program, error message (Err)
FI	Filter
Id	Error message
IF	Error message
Io	Test program, error message (Err)
or	Overrange
PE	Cold cathode measuring circuit (identification)
PI	Pirani measuring circuit (identification)
Pn	Test program
rA	Test program, error message (Err)
rS	Test program, error message (Err)
SA	Parameter storage
SE	Error message
So	Error message
ur	Underrange

B: Literature

-  [1] Sales brochure TPG 300
BG 800 246 PE (9205)
Balzers AG, 9496 Balzers, Fürstentum Liechtenstein
-  [2] Operating guide TPG 300
BG 800 301 BN 4th edition: 4. 1991
Balzers AG, 9496 Balzers, Fürstentum Liechtenstein
-  [3] Operating manual Plug-in modules for total pressure
gauges and controllers TPG 300 und IMG 300
BG 800 342 BE / C (9601)
Balzers AG, 9496 Balzers, Fürstentum Liechtenstein
-  [4] Operating manual TPR 010 Pirani gauge head
BG 800 310 BE / A (9406)
Balzers AG, 9496 Balzers, Fürstentum Liechtenstein
-  [5] Operating instructions TPR 017 Pirani gauge head
BG 800 317 BE 2nd edition: 6. 1991
Balzers AG, 9496 Balzers, Fürstentum Liechtenstein
-  [6] Operating instructions TPR 018 Pirani gauge head
BG 800 318 BE 2nd edition: 6. 1991
Balzers AG, 9496 Balzers, Fürstentum Liechtenstein
-  [7] Operating manual IKR 050 Cold cathode gauge
DN 25 flange
BG 803 030 BE (9502)
Balzers AG, 9496 Balzers, Fürstentum Liechtenstein
-  [8] Operating manual IKR 050 Cold cathode gauge
DN 40 flange
BG 803 031 BE (9407)
Balzers AG, 9496 Balzers, Fürstentum Liechtenstein
-  [9] Operating manual IKR 060 Cold cathode gauge
BG 803 032 BE (9407)
Balzers AG, 9496 Balzers, Fürstentum Liechtenstein
-  [10] Operating manual IKR 070 Cold cathode gauge
BG 803 033 BE (9407)
Balzers AG, 9496 Balzers, Fürstentum Liechtenstein

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Original: German BG 800 300 BD / A



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